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CRITERIA FOR SELECTION OF DESIGNATED PROJECTS

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INTRODUCTION

The purpose of this paper is to study the criteria used in establishing designated project management in the United States Navy, then to compare that criteria to organizational theory and industrial practice. It is hoped that this discussion will improve insight into this form of organization, currently being utilized to a greater and greater extent, and that more meaningful and useful criteria for the establishment of project management can be recommended.

This paper will attempt to clarify and identify project management and its objectives, present a brief history of this type of organization, examine the requirements which originally led to selecting designated projects, and discuss the planning and decision-making process that precedes the establishment of such a project. It will also discuss the costs and the benefits of project management and demonstrate why sound criteria for establishing designated projects are needed.

The specific research question addressed is, what criteria should be utilized in the selection of weapon or support systems to be designated for project management.

CHAPTER I

PROJECT MANAGEMENT: WHAT IT IS AND WHAT IT IS EXPECTED TO DO

Defining Project Management

Project management in the United States Navy is a form of organization whose objective is the definition, development and production of a particular weapon or support system. The project manager is appointed either by the Secretary of the Navy, the Chief of Naval Material or the chief of one of the four bureaus (Ships, Weapons, Supplies and Accounts, Yards and Docks). He is given broad authority for directing the development and acquisition of a weapon system.

Project management is a general concept that encompasses planning, control and supervision of developmental engineering, procurement, and testing of the weapon system or component. It is similar to functional management in that it is basically getting work done through people, with all that implies regarding objectives and communications.[1] However, it differs in some important ways. The project manager has a very specific objective, i.e., to get a weapon system operational with the allotted resources as quickly as possible. When this objective is achieved, the project management organization is disbanded.

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[1] John S. Baumgartner, Project Management (Homewood, Illinois: Richard D. Irwin, Inc., 1963), p. 1.

The characteristics of full projectization include the existence of a project manager of high rank, with a technical and management staff commensurate with the scope of the project. In order to be effective the project manager must have the ability to acquire and keep competent personnel, possess the capacity and authority to perform or supervise the task of system engineering, be able to control the preparation of the project budget, and have authority to reallocate his resources. He also must have ready access to top management, the ability to obtain quick and accurate support from other elements of the Department of Defense, and the capability to prepare project development plans.

The Department of Defense directive that established policy governing the use and application of project management includes this definition:

> System/Project Management: A concept for the technical and business management of particular systems/projects based on the use of a designated, centralized management authority who is responsible for planning, directing, and controlling the definition, development, and production of a system/project; and for assuring that planning is accomplished by the organizations responsible for the complementary functions of logistic and maintenance support, personnel training, operational testing, activation, or deployment. The centralized management authority is supported by functional organizations, which are responsible to the centralized management authority for the execution of specifically assigned system/project tasks.[1]

The term project manager has been used in a variety of situations to identify billets or positions of greatly differing responsibilities and authorities at widely divergent organizational levels in the Navy. Various

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[1] U. S. Department of Defense, System/Project Management, Directive No. 5010.14 (May 4, 1965).

other terms such as program manager, special project officer, systems manager, project officer, and program officer have also been used to identify a position or individual with some of the elements of responsibility of a project manager.

As a step toward dispelling this confusing array of terms the Secretary of the Navy has limited the use of the term project manager to the head of those organizations that are specifically designated.[1] A project can only be named as a designated project by the Secretary of the Navy, the Chief of Naval Material or one of the bureau chiefs of the Naval Material Support Establishment.[2]

This paper uses the term designated project strictly in adherence to the policies of the Secretary of the Navy. To emphasize the restricted use of the term designated project, as of March 2, 1965 there were only nine such projects under the control of the Chief of Naval Material.[3]

Designated projects are established by the issuance of a project charter approved by the Chief of Naval Material. Charters of projects designated by a bureau chief must also be approved by the Chief of Naval Material. The charter establishes the scope of authority, responsibility, and operating relationships of the project manager. Any special delegations

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[1] U. S. Department of the Navy, Project Management in the Department of the Navy, Secretary of the Navy Instruction 5000.21A, September 8, 1965.

[2] Ibid.

[3] U. S. Department of the Navy, Office of Naval Material, Designated Projects Under Command of the Chief of Naval Material, Chief of Naval Material Notice 5430, March 2, 1965.

of authority or necessary exemptions from existing regulations are cited.[1] In addition, the charter assigns a definite date when the project will be reviewed to see if its goals have been substantially met, and if it should be considered for disestablishment at that time.

The Objectives of Project Management

The Department of Defense has expressed the objectives of project management as follows:

> The exceptional management policies established by this Directive are intended to:
>
> A. Give particular attention to the management of, and allocation of resources to, those system projects that are most critical to the Nation's defense posture or costly to the Department of Defense, and;
>
> B. Strengthen management authority and effectiveness, particularly at System/Project Manager level, so that the department of Defense can acquire, deploy, operate, and support such systems/ projects possessing the performance capabilities required within the approved schedule and resources made available.[2]

The goals inferred from the Department of Defense Directive are basically to reduce the lead-time required to get a weapon system operational, and to do this without increasing the requirement for resources.

In an organization as large as the Department of the Navy the successful and expeditious development of a weapon system involves many functionally specialized efforts. Project management is an attempt to

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[1] U. S. Department of the Navy, Office of Naval Material, Project Management in the Naval Material Support Establishment, Chief of Naval Material Instruction 5000.5A, December 7, 1965.

[2] Department of Defense Directive 5010.14, p. 3.

provide an organization with a singleness of purpose that will concentrate the resources, functional talent, and authority necessary to make timely decisions, recognize and correct problems rapidly and ultimately result in the achievement of project goals in the most expeditious manner.

The development of atomic and thermonuclear explosives together with the ability to deliver them have made it mandatory for our future security that reliance be placed on forces in being rather than on plans to mobilize economic, industrial and manpower potentials. As Charles J. Hitch has stated:

> In an all out nuclear war the superior economic war potential of the United States is important only to the extent that it has been effectively diverted to security purposes before war starts.[1]

The implications are clear that reliance cannot be put on weapon systems that are on the drawing board. The success of this nation's defense depends on an inventory of operational weapons of such a capability that any potential enemy will remain extremely reluctant to attack.

Project management has been the primary organizational innovation used by the Department of Defense in attempting to maintain an adequate inventory of deterrent weapons. Proponents of project management do not claim that this form of organization necessarily develops better weapons but they do believe it develops them quicker and by so doing helps to attain and maintain the required forces in being.

Originally project management was viewed as primarily a process

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[1] Charles J. Hitch and Roland N. McKean, The Economics of Defense in the Nuclear Age (Cambridge, Mass.: Harvard University Press, 1960), p. 15.

for obtaining the capability to deliver nuclear missiles, but recent developments, especially the war in Vietnam, have brought limited wars more to the forefront of national defense considerations. Now project management is being utilized to expedite the acquisition of weapons and even logistic support capabilities to be used in less than nuclear wars. An example of a project manager for a logistic support system is the recently designated Navy project manager for the Fast Deployment Logistic Ship.[1] While the characteristics of this type of ship have not been released, from the name itself, it is safe to assume that its primary mission is to deliver logistic support, not weapons.

Various reports that the USSR has developed weapon systems in half the time that it takes the United States have also added impetus to the demand for shortening the lead-time for weapon system development. Peck and Scherer in an exhaustive report on a study of the weapons acquisition process quote reports that ". . . the B-52 required eight and one half years to develop while Bison, the comparable Russian heavy bomber, took only four and one half years."[2] The authors are somewhat skeptical of these reports on Russian capabilities; nevertheless, they recognize that this type of information has increased the Congressional and public clamor for faster development of weapon systems for the United States armed Forces.

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[1] U. S. Department of the Navy, Fast Deployment Logistics Ship; Department of the Navy Organization and Responsibilities for, Secretary of the Navy Instruction 5430.75, October 18, 1965.

[2] Merton J. Peck and Frederick M. Scherer, The Weapons Acquisition Process: An Economic Analysis (Boston: Harvard University Graduate School of Business Administration, 1962).

Project management was and is being used in the belief that it will reduce the lead-time required to place a weapon system in the hands of operational units. In the next chapter the history of the development of project management in the Navy will be reviewed.

CHAPTER II

HISTORY OF PROJECT MANAGEMENT IN THE NAVY

New organizational management systems are not often the results of major breakthroughs as is sometimes the case for technological developments. The development of management techniques is an evolutionary process. Many of the elements of project management have no doubt been utilized by mankind for decades if not centuries. However, the technological explosion during and since World War II has brought about conditions that make the project manager form of organization desirable. These technological conditions have caused rapid expansion in the number and types of potential weapon systems. The Department of Defense has expressed the opinion that the project management system is the best form of organization to exploit the potentials of new weapon systems.[1]

The earliest project management organization in the United States was the Manhattan District project for the development of the atomic bomb. This organization was formed with a specific development objective and was given the resources to accomplish that objective as expeditiously as possible. The success of the Manhattan project was probably responsible for adoption of the project management approach in evolving weapon systems when the United States was later threatened during the cold war.

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[1] Department of Defense Directive 5010.14.

In the Navy the development of the Polaris missile is usually cited as the first, the biggest, and the most successful result of project management.[1] The Special Projects Office was established in November 1955 under Rear Admiral W. F. Raborn to manage the development of the sea based Polaris ballistic missile.[2] The original mission of the Special Projects Office was to find a solution to the problems of adapting the liquid fueled Jupiter missile to shipboard environment. In December 1956, the mission of the Special Projects Office was changed to the development of a solid propellant missile and the complete fleet ballistic missile system. This effort was brought to a successful conclusion in 1960, three years ahead of schedule.[3]

However, years before the establishment of the Special Projects Office, Vice Admiral Hyman G. Rickover (then Captain) headed an organization that had many of the attributes of a designated project. Admiral Rickover and his group were responsible for developing the atomic submarine, from inception of the idea to a reality, in five years. During approximately the same era it took eight years to get the B47 bomber from drawing board to its first flight.[4] Admiral Rickover was never referred

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[1] The Extension of Special Organizational Patterns and Management Techniques to Additional Weapon Systems, A report prepared for the Assistant Secretary of Defense (Installations and Logistics) by United Research, Inc., January 1962, p. 2-2. Hereafter cited as United Research Report.

[2] U. S. Department of the Navy, From Polaris to Deep Ocean Technology (Special Project Office, 1964), p. 3.

[3] Ibid.

[4] Clay Blair, Jr., The Atomic Submarine and Admiral Rickover (New York: Henry Holt and Company, 1954), p. 261.

to as a project manager nor is he designated as one today, but his efforts have been regarded as the most successful accomplishment of a project manager.[1]

The problem of lead-time in weapon system development has concerned other organizations besides the Navy Department. In 1956, a Department of Defense study team headed by the then Deputy Secretary of Defense, Mr. Reuben Robertson, Jr., concluded that it took ten years to develop a new weapon from concept to operational availability.[2] In 1959, the House Committee on Government Operations found that the missile management agencies, project managers for the highest priority missile systems, had succeeded in significantly reducing the ten year lead-time cited by the Robertson report.[3] Although this report did not use the term project management, it gave a significant boost to the methods of organization and control now utilized by a designated project manager.

Two major study groups in the Navy have been concerned in part with weapons acquisition problems and project management. In 1959, as a result of the Franke Board's recommendations, the Bureau of Ordnance and the Bureau of Aeronautics were merged, forming the Bureau of Naval

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[1] Speech by Howard W. Merril, Special Assistant to the Secretary of the Navy, to the Graduating Class, Defense Weapon Systems Management Center, Wright-Patterson Air Force Base, Ohio, March 26, 1965.

[2] U. S. Department of Defense, Ad Hoc Study Group, Manned Air Craft Weapon Systems: A Program for Reducing the Time Cycle From Concept to Inventory (The Robertson Report) July, 1956, declassified in 1960.

[3] U. S. Congress, House Committee on Government Operations Report, Organization and Management of the Missile Programs, H.R. 1121, 86th Congress, First Session 1959, p. 57.

Weapons.[1] It was expected that this merger would establish a logical place for the assignment of present project managers such as the Director, Special Projects Office and for future project managers. In 1962, the Review of the Management of the Navy, the Dillon Report, was also concerned with the centralization of project managers. This report stated:

> Of all the compelling reasons for the establishment of a cohesive Naval Support organization, the most fundamental is the need for strong, centralized project management. Only by having an authoritative project manager at a sufficiently high level in the support organization can the Navy effectively manage its most important programs, many of which involve more than one material bureau.
>
> Project Managers for the Navy's most significant projects would individually report directly to the Chief of Naval Support. Of high rank commensurate with the task assigned, the Project Manager would have complete authority, derived from the Chief of Naval Support, for the executive direction of his assigned project.[2]

The Chief of Naval Support referred to above is the name used by the Dillon Committee for the Chief of Naval Material. The Office of Naval Material, as envisioned by the Dillon Board insofar as project management is concerned, was established in November, 1963.[3] On the staff of the Chief of Naval Material is a division, headed by a senior Navy captain, which is responsible for preparing staff studies to determine recommendations for the designation of projects, preparing and circulating proposed project manager charters, recommending staffing for designated

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[1] U. S. Department of the Navy, Report of the Committee on Organization of the Department of the Navy (NAV EXOS P-1996), 1959.

[2] U. S. Department of the Navy, Review of the Management of the Navy, 15 December 1962, Vol. I, p. 141.

[3] U. S. Department of the Navy, Naval Material Support Establishment: Initial Operation of (Chief of Naval Material Notice 5400), November 29, 1963.

projects and reviewing the status of accomplishments of previously designated projects.

In 1964, the Secretary of the Navy established the position of The Special Assistant to the Secretary and appointed Howard W. Merrill to fill it. Mr. Merrill was charged among other things with the responsibility of making greater use of Project Management.[1]

The nuclear power plant organization headed by Admiral Rickover and the Polaris missile team of Admiral Raborn were established in the early and mid-fifties. There was no further escalation in the use of project management in the Navy until the Surface Missile System Project was designated as a project on 26 February 1964,[2] after the establishment of the post of Chief of Naval Material. Since the designation of the Surface Missile System Project two more projects have been designated by the Secretary of the Navy, six by the Chief of Naval Material and eighteen by the bureau chiefs. Appendix I contains a complete list of designated projects and the official instructions for each project. It is up to date as of 1 February 1966.

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[1] Speech by Earl Kuhl, Director, Systems Development Division, Office of Management Information, Department of the Navy, to the Navy Financial Management Class, The George Washington University, January 12, 1966.

[2] U. S. Department of the Navy, Surface Missile Systems Project: Navy Department Organization and Responsibilities For, (Secretary of the Navy Instruction 5430.56A), February 26, 1964.

CHAPTER III

THE PLANNING PROCESS PRECEDING SELECTION OF A DESIGNATED PROJECT

The evolutionary planning process that results in the selection of a designated project begins with the issuance of a general operational requirement (GOR) by the Chief of Naval Operations.[1] A GOR is prepared for each functional warfare and support area. This document states, in relatively broad yet significant terms, the capabilities that the Navy requires within an area.[2] Estimates of present and potential future enemy threats are set forth. The GOR encourages research and exploratory development in the areas of the Navy's most pressing needs. Technical bureaus are encouraged to submit development proposals that might fulfill the operational needs stated in the GOR. The GOR provides guidance in making trade-offs in weapon design by providing information on the relative importance of the various capabilities desired. It also provides as much information as possible concerning operational concepts.

After assessing the capabilities needed to meet future military requirements as projected by the GOR and other long-range strategic and

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[1] U. S. Department of the Navy, General Operational Requirements, Instruction for Preparation of (Chief of Naval Operations Instruction 3910.9), June 24, 1964.

[2] U. S. Department of the Navy, RDT&E Management Guide (NAVSO P-2457), July 1, 1965.

tactical studies, the Chief of Naval Development may promulgate an Exploratory Development Requirement (EDR). This document states the need for investigations and studies to demonstrate new techniques in functional areas, or the feasibility of a system, subsystem or component. The EDR encourages development effort toward the expansion of naval capabilities through application of advances in technology. To do this the EDR directs activities toward the solution of specific military problems but not to the extent of developing hardware for experimental or operational testing. From these activities it is hoped that the pool of technical knowledge can be expanded, resulting in the discovery and development of future weapon systems.[1]

When a new specific capability is required, the Chief of Naval Operations or the Commandant of the Marine Corps issues a Tentative Specific Operational Requirement (TSOR). This document states the need for developing a particular operational capability and describes the identifiable characteristics necessary in the weapon system to fulfill the requirement. The TSOR outlines the performance goals and provides other guidance, such as information on the plan for use of a particular system and guidelines for weighing alternatives and making tradeoffs in order to achieve the best possible results.[2]

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[1] U. S. Department of the Navy, Exploratory Development Requirements, (Chief of Naval Material Instruction 3910.4), May 1, 1965.

[2] U. S. Department of the Navy, Specific Operational Requirements (SOR) and Tentative Operational Requirements (TSOR); Instructions for Preparation of, (Chief of Naval Operations Instruction 3910.6B), June 11, 1964.

In response to a TSOR the Chief of Naval Material may initiate a Proposed Technical Approach (PTA). The PTA proposes feasible alternatives in accomplishing the objectives set forth by the TSOR. Each proposed alternative is supported by data concerning costs and benefits. The PTA emphasizes alternative technical, as well as alternative operational, approaches to providing for the stated requirement. It provides the best available estimates on trade-off options of cost versus time and cost versus performance. The goal of the PTA is to provide the Chief of Naval Operations and/or the Commandant of the Marine Corps with enough information on costs, available alternatives, and potential military worth so that a sound decision can be made before initiating more specific requirements.[1]

New weapon system ideas have been generated at such a rate during the last two decades that there is no shortage of innovations. The problem is to decide which of many systems, subsystems and components are worth pursuing.[2] The Proposed Technical Approach is extremely important in leading to the best choices for development.

The next step in the planning process is the Advanced Development Objective (ADO). This document issued by the Chief of Naval Operations describes a requirement for an experimental development which is not yet considered a certainty as to its military usefulness, technical feasibility or cost acceptability. The ADO outlines the necessary step between

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[1] U. S. Department of the Navy, Proposed Technical Approaches; Instructions for Preparation of (Chief of Naval Operations Instruction 3910.8), February 28, 1964.

[2] Peck and Scherer, p. 237.

exploratory development and engineering development. The primary function of the ADO is to develop enough information so that hardware can be developed for test purposes and eventually allow the issuance of a Specific Operational Requirement.[1]

The Specific Operational Requirement is a statement by the Chief of Naval Operations and/or the Commandant of the Marine Corps outlining the need for a particular capability and describing the characteristics of the system. The SOR defines performance requirements throughout the system's operational environment; it establishes reliability and maintainability goals and personnel requirements. The SOR is the final step in the definition of requirements and contains comprehensive guidance to the Chief of Naval Material for use in developing an adequate Technical Development Plan. The SOR is the key decision in the transition from research to systems development.[2]

In response to the SOR the Chief of Naval Material prepares a Technical Development Plan (TDP).[3] Compared to the Proposed Technical Approach, preparation of the TDP is expensive in terms of time, money and talent. The TDP is a comprehensive and definitive plan for the development of a specific system. For a complex weapon system the TDP may run to hundreds of pages and represent up to a half million dollars of investment in planning and technical effort. A TDP may be either prepared by a Navy

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[1] RDT&E Management Guide.

[2] Chief of Naval Operations Instruction 3910.6.

[3] U. S. Department of the Navy, Technical Development Plan (Chief of Naval Operations Instruction 3910.4B), June 24, 1964.

laboratory or contracted to industry.[1]

The Secretary of Defense requires a Project Definition Phase (PDP) for projects requiring $25 million or more of Research Development, Test and Evaluation funding and for projects involving $100 million or more for production funding.[2] The PDP is a formal step in the development process involving preliminary engineering, contract and management planning prior to the award of a full-scale development contract. On potentially large projects the PDP may be prepared by two or more competing contractors all working closely with Navy representatives.

The ultimate objective of the Project Definition Phase is to provide a suitable basis for the assurance that management decisions to pursue, change or cancel development projects are based on the best possible information concerning realistic cost, schedule, and performance estimates.

During the preparation of the Technical Development Plan and/or the Project Definition Phase, the Secretary of the Navy, the Chief of Naval Material or one of the material bureau chiefs must consider whether or not to declare the project as a designated project. The alternative is to assign it to one of the material bureaus where it would be handled routinely as one of a large number of projects.

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[1] RDT&E Management Guide.

[2] U. S. Department of Defense, Project Definition Phase (Directive No. 3200.9), August 1, 1963.

In the next chapter, the costs and benefits of project management and other considerations involved in deciding whether or not a work effort should be designated as a project will be discussed.

CHAPTER IV

BENEFITS AND COSTS OF PROJECT MANAGEMENT

The subject of project management is a controversial one among management personnel of the Navy. The objective of this chapter is to delineate the lines of the disagreement and in so doing establish the reasons why it is essential that sound criteria be used in deciding whether or not a project is assigned the status of a designated project.

The development of weapon systems is by far the largest single element of government spending.[1] When this fact is considered in the light of the urgency of our national defense, it is clear that weapon systems must be developed as expeditiously and economically as possible. Any form of organization or method of management that assists in the realization of this goal obviously must be considered.

The Secretary of Defense has made it clear that he considers project management an important technique and has directed that it be used under certain specified conditions.[2] The Secretary of the Navy has also expressed the same policy. In a statement before the Joint Session of the Committee on Armed Services and the Defense Subcommittee of the Committee on Appropriations, the Secretary of the Navy Mr. Paul H. Nitze said:

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[1] Peck and Scherer, p. 95.

[2] Department of Defense Directive No. 5010.4.

> Since the Naval Material Support Establishment was established last year we have been making considerable use of designated project management in Navy material programs. The concept calls for organization of a special management group oriented to producing a single weapon system or a family of related systems directed at a single Navy mission. The project management group is superimposed on existing functional organizations within the Material Bureaus. The Special Projects Office, which developed the POLARIS, was the first such group in the Navy, and the "3-T" or Surface Missile Systems Project is in some ways the most ambitious project management effort we have attempted to date. Additional project managers have been designated for the F-111B/PHOENIX Air Superiority Weapons System and for the Automatic Carrier Landing System. We expect to make further use of this management technique in the future.[1]

On the other hand, Rear Admiral William A. Brockett and Rear Admiral Charles A. Curtze of the Bureau of Ships, both cited the increasing use of project management as one of their reasons for early retirement from the Navy.[2] They both felt that the increasing use of project management was undermining the importance of their functions in the Bureau.

Since project management changes the roles, status, functions and purposes of many traditional organizational units in the Navy, it is not surprising that there is disagreement on its costs and benefits. The rest of this chapter will discuss these costs and benefits.

The Benefits of Project Management

The ultimate purported benefit of project management is to shorten the time from the inception of the development of a weapon system until the time when it is operationally deployed. It is believed that the project manager with his single management authority and responsibility for design, development, production, evaluation and support of the complete operational

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[1] Paul H. Nitze, quoted in U. S. Department of the Navy, Budget Digest Fiscal Year 1966 (NAV P-1355), November 30, 1965.

[2] Washington Post, October 28, 1965, p. 1.

system is able to shorten the time required for weapon system development.[1]

One of the advantages of project management that makes possible achievement of this objective is the capability of faster decision making. A project manager by himself has the authority and capability to make decisions that ordinarily could be made by the functional part of the Navy organization only after clearance by affected activities and numerous committee conferences to resolve differences of opinion.[2]

To coordinate activities with faster decision making, the ideal project manager, under this system, should have the ability to recognize and correct problems more quickly than under other methods of project development.[3] This quicker reaction to solving problems is a very important advantage in the development of a new weapon system. The uncertainties of major new programs are so great that a multitude of problems is always present.[4] The prompt resolution of these problems is essential if the objective of shorter lead-time is to be obtained.

A single authority, responsible for all components, sub-systems and interface problems, should assure their compatibility.[5] When two or more organizational units develop components or sub-systems, as is often the case in the Navy bureaus, the recognition and resolution of compatibility

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[1] A speech by J. M. Beggs, Program Management -- Authority and Responsibility, to the Department of Defense Conference on Program Management, May 12, 1963.

[2] Ibid.

[3] Chief of Naval Material Instruction 5000.5A.

[4] Peck and Scherer, p. 17.

[5] J. M. Beggs.

problems is more difficult than when one official is responsible for all decisions affecting the system.

Trade-off decisions made during design and development are based upon the considerations of the total system and not upon their effect on a component or sub-system.[1] A functional organization may in all conscientiousness make trade-off decisions concerning a component or sub-system without being aware of the potential effect on other units. Trade-off decisions made by a project manager and based on full and complete information should avoid unpleasant interface controversies by resolving bureau conflicts or bringing the problems to the proper higher authority for resolution.

Mr. J. M. Beggs has also cited some other advantages:

> First, because of the close association of all members of the program team, a great deal of cross-fertilization in technical and, more important, management areas takes place between companies, industries, laboratories and government. Second, the concept places emphasis on new techniques and organization with resulting study and experimentation, and third, there has been a general upgrading of the planning function with resultant better understanding of defense and industry problems. Indeed, a revolution in long-range planning is currently taking place which can largely be traced to the program management concept. These advantages are of transcending importance in the acquisition of highly complex major weapons systems.[2]

One of the new techniques used for long-range planning was developed, or at least perfected, by a project manager. PERT, Program Evaluation and Review Technique, was at least partially developed by the Special Projects Office, the Navy's designated project for the Polaris Fleet Ballistic Missile. This technique is now widely accepted and used by government and industry.[3]

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[1] Ibid.

[2] Ibid.

[3] From Polaris to Deep Ocean Technology.

Project management helps keep Navy's top officials better informed on weapon system development progress and problems. In addition to regular reporting by his organization, the project manager personally appears before the Secretary of the Navy, Chief of Naval Operations, Commandant of the Marine Corps and the Chief of Naval Material at least every six months at the Secretary of the Navy's Management Information Center briefings.[1]

The Navy top managers are of the opinion that the investment in long-range planning, such as performed by project managers, has paid definite dividends in the form of better allocation of resources and by reducing development lead-time.[2]

Some proponents of project management center their arguments on the weakness of functional management. The traditional bureau organization of the Navy is a form of functional organization. Mr. Roswell Gilpatric, then the Assistant Secretary of Defense (Installations and Logistics),in a speech before the Defense Conference on Program Management, May 1963, quoted Peter Drucker on the weaknesses of functional organization as follows:

> But even proper functional organization by stage of process does not adequately serve the structural requirements of the business. It makes it difficult to focus on business performance. Every functional manager considers his function the most important one, tries to build it up and is prone to subordinate the welfare of the other functions, if not of the entire business, to the interests of his unit. There is no real remedy against this tendency in the functional organization. The lust for aggrandizement on the part of each function is a result of the laudable desire of each manager to do a good job.

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[1] Earl Kuhl speech.

[2] *Ibid*.

> Functional organization of necessity puts the major emphasis on a specialty, and on a man's acquiring the knowledge and competence that pertains to it. Yet the functional specialist may become so narrow in his vision, his skills and his loyalties as to be totally unfit for general management.
>
> A further weakness is the difficulty of setting objectives in the functional pattern and of measuring the results of functional work. For the function as such is concerned with a part of the business, not with its whole. Its objectives will therefore tend to be set in terms of 'professional standards' rather than in terms of the success of the business. They will tend to direct the attention and efforts of managers away from business success rather than toward it, will tend too often to emphasize and to reward the wrong things.
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> Because of this, functional organization leads to levels upon levels of management. It can rarely train or test a man in business performance, and almost never in a position where he has full responsibility for results. And, largely because it needs many levels, it tends to erode the meaning of each job and to make it appear nothing but a stepping-stone to a promotion.[1]

The Air Force also extensively uses project management. In commenting on the reasons for this, Lieutenant General Howell Estes has indicated that the parochial staff organizations of the Air Force, with their traditional functional methods, could not provide the quick and accurate responses that are required in the development of new systems.[2] One official, who requested that he not be quoted, stated that, in his opinion, the evolution of project management in the Navy was directly due to the inability of the material bureaus to get the job done, either because of their tradition-bound organizations, understaffing, or both.

The Costs of Project Management

Possibly due to the fact that project management is held in high esteem by the Department of Defense and the Department of the Navy, in

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[1] Peter Drucker, The Practice of Management (New York: Harper and Brothers, 1954), p. 208.

[2] Howell M. Estes, Lt. Gen., "You Must Provide A Streamlined Procedure," Armed Forces Management, (December, 1961), p. 14.

recent years there have been relatively few published reports on the negative effects of project management. Some writers and speakers have cited "limitations" after giving the advantages of project management.[1] One person interviewed summed up the attitudes implied by many others when he said, "Project management is effective, but it is expensive."[2] The expense referred to is the use of managerial and technical talent, not in the cost of weapons.

One of the negative aspects of project management is the fact that it establishes an elite group, which has historically been disrupting to the non-elite.[3] The establishment of such a group tends to siphon off the elite for the "important" project management tasks and leaves the non-elite performing other jobs. This often results in the elite depending on the non-elite for support services and may cause an unacceptable downgrading of the non-elite's work. Peck and Scherer have described this possibility as follows:

> The time of top policy makers is limited, as is the supply of outstanding program managers and technical specialists. If too many elite project groups are established, excessive delegation of decisions to subordinates, serious understaffing of lower priority project groups, and/or ineffective coordination among programs will undoubtedly occur.[4]

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[1] Speech by Simon Ramo, The Program Manager -- Substance or Symbol, to the Defense Conference on Program Management, May 12, 1963.

[2] Interview with Allen Cook, of the Project Management Branch, Planning Division, Office of Naval Material.

[3] Resources Management, Systems/Project Management, Unpublished report, (Washington, D.C.: Industrial College of the Armed Forces, 1965).

[4] Peck and Scherer, p. 84.

Another disadvantage of project management is the fact that the requirements for documentation and reporting are extremely onerous and consume a great amount of time on the part of the project manager and his key subordinates.

The Chief of Naval Material assigns a requirement for 32 distinct responsibilities to a designated project manager.[1] Many of these requirements involve documenting not required by non-designated projects. In particular, the designated project manager must prepare a comprehensive Project Master Plan immediately upon official notification of his appointment.[2]

The Project Master Plan must include:

1. Historical data of the technical feasibility determinations and decisions which prompted the initiation of the new weapon system.
2. The documentation of the current approved requirement to be satisfied by the execution of the project.
3. A summary of highlights of project data that is most significant to Navy and Defense top managers.
4. A description in narrative terms, and graphically illustrated, of the physical and operational characteristics of the system.

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[1] _Chief of Naval Material Instruction 5000.5A_.

[2] U. S. Department of the Navy, _Guide for the Preparation of Project Master Plans_ (Chief of Naval Material Instruction 5200.11), February 24, 1965.

5. A detailed management plan describing the organization, management control systems and other essential information.
6. A project milestone plan that selects and identifies events that are of major importance toward achieving the weapon system objectives.
7. A plan for conducting the Project Definition Phase.
8. A plan for system development effort from authorization of development through test, evaluation and up to approval for service use.
9. The documentation of current production, installation and base loading plans for the system to provide operational and logistic planners responsible for fleet introduction and support with adequate information.
10. An integrated logistic support plan to ensure the development of effective logistic support.
11. A personnel and training plan to provide planned estimates of the military and civilian training and manpower requirements of the weapon system.
12. A financial plan encompassing the costs of the projected life cycle of the project.
13. A systems effectiveness plan for achieving the required degree of system reliability, maintainability, operability and supportability.

14. The outlining of the progress reporting system, including significant potential problem areas.

From these requirements it is obvious that the preparing and maintaining of the Project Master Plan is a task of considerable magnitude. There is a possibility that this effort will prove worthwhile only in the case of projects of national urgency.

In an effort toward providing the requirement for personnel trained in the management techniques used by project managers, the Department of Defense established the Defense Weapon System Management Center.[1] In a memo dated 10 March, 1964 to the Secretaries of the Military Departments, the Director of Defense Research and Engineering, the Assistant Secretaries of Defense and the Special Assistant and Assistants to the Secretary, Mr. Cyrus Vance, then Deputy Secretary of Defense, stated the purpose of this training as follows:

> The training should prepare the potential program manager to analyze the problems and proposed actions submitted by his subordinates and by industry and to take effective action. Emphasis should be placed on the solution of typical weapons systems management problems, and a close relationship maintained between the actual problems encountered in this work and the curriculum.
>
> The curriculum should contain a balanced emphasis on the problems of technical development, activities, procurement, budgeting, programming, cost and schedule analysis, production, facilities, logistical support, and the best techniques available for management problem display and analysis. The curriculum may also contain service peculiar regulations and procedures, but not to the subordination of its main purpose.

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[1] U. S. Department of Defense, <u>Defense Weapon Systems Management Center</u> (Directive No. 5160.55), October 26, 1965.

Without considering the possible long-range beneficial effects of this type training it is obvious that the program envisioned by Mr. Vance will be executed at the cost of a sizeable investment in talent and facilities.

A summary of the benefits acclaimed for project management shows that they are substantial. The reduced lead-time, from inception of development to the operational deployment of a major weapon system, is obviously of major importance during the present cold war situation. The recent advances in technology have made it imperative that weapons be developed and ready before the outbreak of hostilities. No longer can the industrial might of the United States wait until war starts and then commence mobilization. The proponents of project management claim to have evidence that this form of organization has reduced lead-time for weapon systems development.[1] However, the evidence is not conclusive. One factor, whose effect cannot be measured, is the impact of national priority on the weapon systems that were developed in less than the projected lead-time.[2] Any program that is universally recognized as essential to national security might well receive enough attention and expeditious handling to shorten lead-time, regardless of the form of management or organization.

Criticism of project management shows that the costs in the morale of functional talent required to do the voluminous documentation, the dilution of skilled personnel and the effort required to train

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[1] United Research Report, pp. 1-4.

[2] Ibid.

personnel for project management duties are considerable.

The significance of the potential gains from project management and the substantial costs of this form of organization make it essential that a decision to declare a project as a designated project be carefully considered and that sound criteria for its designation be established. The next chapter will discuss the present officially promulgated criteria and other guidelines concerning the selection of weapon or support systems to be managed as designated projects.

CHAPTER V

CRITERIA FOR ESTABLISHING DESIGNATED PROJECTS

The Search for Criteria Within the Department of Defense

In order to find out if project management could be expanded to include projects of lesser importance than those in the national urgency category, the Department of Defense contracted with the United Research Corporation of Cambridge, Massachusetts to perform a study. In January 1962, this contract resulted in the completion of a report entitled, "The Extension of Special Organizational Patterns and Management Techniques to Additional Weapon Systems."[1]

The study examined the organization and management control systems that had been used by previously established designated projects. The present designated projects were evaluated as to accomplishments in performance of the weapon system, time compression from concept to operational capability and costs incurred.

In evaluating the performance aspect, United Research personnel tried to determine if the weapon developed did what it was supposed to do with tolerable reliability. They concluded that "on balance" the six

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[1] United Research Report, The Extension of Organizational Patterns and Management Techniques to Additional Weapon Systems, A report prepared for the Assistant Secretary of Defense (Installations and Logistics), January, 1962.

programs studied appear to have done well as far as performance of the system is concerned.[1]

To evaluate time compression, the United Research study attempted to establish whether or not a system was delivered on schedule against a tight time constraint. It concluded that the performance of project managers in meeting or beating time schedules was outstanding and that time compression was probably the most important characteristic of the projects studied.

In judging the effectiveness of economical performance the United Research study measured actual cost against original estimates. Uncertainties make this procedure an unreliable technique and the report conceded the need for a better means of measurement, although it could offer none.[2] Nevertheless, the report indicates that the costs of all projects studied substantially exceeded the original estimates and although the exact causes for such cost overruns could not be identified, possibilities cited were: a lack of economy in the conduct of the program, the changing dimensions of the projects in terms of numbers of weapons or their specifications, the basic difficulties in forecasting costs of advanced weapons, or a combination of all of these.[3] Peck and Scherer observe that the weapons acquisition process is often unfavorably compared with the development process for commercial products but that when commercial developments push the state of the art the same problems occur: costs overrun, target dates slip and the product fails to meet

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[1] Ibid., pp. 1-10.

[2] Ibid., pp. 1-9.

[3] Ibid., pp. 1-11.

performance promises.[1] This leads to the presumption that there is no sound method of determining whether or not the performance of the designated projects has been economical in the total costs of the weapons delivered.

After the study of the records of previously designated projects, United Research investigated the possibility of extending project status to additional Navy programs. The report on this subject reads as follows:

> The extension of anything approaching full projectization to additional Navy programs would almost certainly be greeted with vigorous resistance by Bureau personnel and perhaps by many individuals and offices within CNO and other parts of the Navy. Nevertheless, on a selected basis, it is believed that a considerable degree of projectization could be applied to several Navy programs without the dire consequences so confidently predicted by many persons who were interviewed in the Navy. The selection of programs to which a measure of projectization should be applied will require considerable care. To have a chance of success, the program must be of importance to the over-all mission and future survival of the Navy as an independent entity. It must be a relatively high priority project, involving considerable complexity. At the same time, if it involves a technological area in which there is a real scarcity of in-house technical personnel, it will tend to have some adverse effect on the existing capability of the technical bureaus.[2]

This generalized and qualified statement offers little guidance for the useful criteria needed for selecting designated projects. To tackle this problem of useful criteria United Research developed a set of weights for urgency, complexity and concurrency. Urgency is considered in the context of requiring time compression, complexity is concerned with many technical and interface problems, and concurrency

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[1] Peck and Scherer, p. 8.

[2] United Research Report, pp. 5-3.

is used in the sense that steps such as development, production, training, site location and construction are <u>not</u> taken sequentially but in such a manner as to maximize time compression.[1] The report admits that it is especially difficult to assign these weights and that the approach contains so many qualitative judgements that it is extremely crude.

The formal recommendations of the United Research report include only the following brief statement on the subject of criteria for selecting designated projects:

> The Navy should be urged to extend projectization to at least a small number of selected programs within BuWeps and BuShips. The criteria for selection should be relatively high urgency, importance to the Navy mission and programs involving technical areas in which the Navy has a reasonable number of high quality personnel. Care should be taken that project officers are granted adequate authority and resources for carrying out their responsibilities.[2]

Although the usefulness of the recommendations of the United Research Report appears limited, the report does provide substantial background information and some insight into the question of the required criteria for establishing designated projects.

In 1963, in New London, Connecticut, the Department of Defense held the Defense Conference on Program Management,[3] which was totally concerned with project management as defined in Chapter I. The then assistant Secretary of Defense (Installations and Logistics), Thomas D. Morris called the conference to:

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[1] <u>Ibid</u>., pp. 6-6.

[2] <u>Ibid</u>., p. ii.

[3] U. S. Department of Defense, <u>Defense Conference on Program Management, Conference Proceedings</u>; (Washington: Headquarters, Department of Defense).

> . . . explore with key personnel throughout the Department of Defense the benefits and problems which exist in specialized management and to explore and recommend actions which will improve this method of management in all services.[1]

Although the conference was concerned with other matters in addition to criteria for establishing designated projects, this subject was near the top when agenda items were solicited:

> Generally, replies could include but are not limited to: Department of Defense and other policies or controls; the method of selection of projects for special management; the authorities and responsibilities of the manager; the organization and staffing of the management office; the methods for planning and scheduling engineering, production, and support of a special project; the techniques for budgeting and control of funds; the procedures for issuing directives, reporting, and communication techniques; the control of the contract effort; the techniques for evaluation and decision making; and the concepts for updating the state of science and technology within the project.[2]

Present at this conference were representatives from the office of the Secretary of the Navy, Office of Naval Material, Office of Naval Research, the Chief of Naval Operations Staff, Headquarters Marine Corps, Bureau of Naval Personnel, Bureau of Naval Weapons, Bureau of Ships, Bureau of Supplies and Accounts, Bureau of Yards and Docks, the Special Projects Office, counterpart agencies of the Army and Air Force, Department of Defense, Bureau of the Budget, Atomic Energy Commission and the National Aeronautics and Space Agency.[3]

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[1] U. S. Department of Defense, "Defense Conference on Program Management," a letter to the Navy Department, Chief, Bureau of Naval Weapons, Washington, December 13, 1962.

[2] Ibid.

[3] U. S. Department of Defense, "Discussion Outlines for the Defense Conference on Program Management," Washington, 1963.

The Bureau of Naval Weapons submitted 74 recommended agenda items, three of them related to the selection of criteria for the establishment of designated projects.[1] Item number eight was, "What degree of complexity and/or criticality warrants the selection and placement of projects under specialized management?" The comments submitted on this question by the Bureau of Naval Weapons were as follows:

> All programs of one million dollars or more should be subject to program management controls to insure proper balance, economic utilization of resources and timely delivery. Programs of greater cost will also have an added degree of complexity and therefore warrant greater management depth and scrutiny. Only those programs which are critical because of considerable cost, numerous difficulties, or priority established by the high service echelon should be permitted to install a vertical organization and then only for the duration absolutely required. Personnel ceiling controls do not permit many vertical organizations and each time these are created there may be an adverse effect on other programs.[2]

The twenty-fifth agenda item submitted by the Bureau of Naval Weapons was, "In your opinion what is the lowest level at which a project should be placed under systems management?" The accompanying comment read as follows:

> The level of management at which a project should be placed for systems management will vary. Factors to be considered in placement are the importance of the project, the difficulties and the complexities that are expected to be encountered, the priority of the project and the amount of funds involved. Other similar systems (family groups) should also be considered. It may be found that a group of projects of similar characteristics should be established at a high echelon level. On the other hand, effective management of a system might be adequately realized at

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[1] U. S. Department of the Navy, Bureau of Naval Weapons, "List of Topics for Defense Conference on Program Management," Washington, 1963.

[2] *Ibid.*, p. 5.

> a middle-management level. Projects should not be over-managed at any level.[1]

The thirty-second item was specifically directed to the question of criteria, asking, "From your experience, is there a set of criteria that can be established for determination of those projects to be placed under systems management?" Comment on this question was as follows:

> A project or program which is proposed and is expected to encounter difficulties of a technical nature, or is a complex program requiring a high degree of coordination and control, should become subject to systems management. The amount of funds involved in the proposed project or program is also an important but not necessarily a controlling factor. For example, a program in production phase with a high number of production units with a nominal unit cost may total a large sum, but due to the repetitive nature and lack of production problems would not require a system manager merely due to the funds involved. A satisfactory degree of management could be devoted to the program by a manager having several such programs under his production cognizance. If a program is behind time to the extent that it seriously affects mission capability or affects other affiliated systems or subsystems of an important nature, then systems management may be warranted.[2]

At the New London Conference, the attendees were organized into fourteen panels. Panel number one was given the task of discussing basic concepts and policies involved in the management of systems and the production of military equipment.[3] The first major topic on the agenda for this panel was, "The selection of systems and programs for special management treatment." The panel report on this subject appeared in the conference proceedings as follows:

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[1] Ibid., p. 17.

[2] Ibid., p. 21.

[3] Discussion outlines for the Defense Conference on Program Management.

Criteria for Projectization of a Program

The panel has further agreed that one or more of the following criteria may be sufficient to warrant projectization and the assignment of clear management authority for a specific program:

1. Concurrency
2. Advanced technology
3. National priority -- Urgent military necessity
4. High cost
5. Multiple agency interest
6. Top level interest
7. Project difficulties.[1]

The criteria contained in the Department of Defense directive, which was published subsequent to the New London Conference, so closely parallel the panel's recommendations that it is a safe assumption that these recommendations were reviewed and given strong consideration by the Office of the Secretary of Defense.

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[1] Defense Conference on Program Management Conference Proceedings, p. 3.

CHAPTER VI

OFFICIAL CRITERIA OF THE DEPARTMENT OF DEFENSE

In Department of Defense Directive 5010.14 of 5 May, 1965, the Secretary of Defense prescribed the policy to be followed in using project management in the Department of Defense.[1] This instruction includes criteria for the selection of project management as well as policy statements and objectives. The criteria cited in the instruction circumscribe the types of weapon or support systems to be designated as projects.

The Department of Defense instruction prescribes conditions under which it is mandatory to use project management; it also presents guidelines for using project management for projects that do not fall under the mandatory requirements. The mandatory requirements include two basic categories. The first requires that all new systems or major modifications to existing systems that are rated in the highest priority (BRICK-BAT) of national urgency be managed under a designated project manager. The priority projects of national urgency are cited in Department of Defense Directive S 4410.3, a secret publication. Since the directive is classified as secret, the contents cannot be cited at present; however, weapon systems that were in the national urgency category during

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[1] Waller C. Moore, "All Echelons State Policy on Project Management," <u>Navy Management Review</u>, (Washington: December, 1965 and January, 1966), p. 7.

the 1950's include the Atlas, Titan and Minuteman ballistic missiles, the Nike-Zeus missile defense system, the ballistic missile early warning system and the Polaris fleet ballistic missile.[1]

The second category of mandatory application concerns the naming of new programs as designated projects when it is estimated that the Research, Development, Test and Evaluation (RDT&E) requirement for funding will exceed twenty-five million dollars or the estimated funds for production will exceed one hundred million dollars. This category applies to new systems and major modifications of existing systems.

For the selection of designated projects, not in the mandatory classification, the Department of Defense has stated that the program should have one or more of the following attributes:

1. Have a significant effect on United States military posture;

2. Are closely related and when taken collectively, would qualify for this exceptional management under the threshold, are estimated to require total cumulative RDT&E financing in excess of twenty-five million dollars, or are estimated to require total production investment in excess of one hundred million dollars;

3. Are conducted on a substantially concurrent basis, particularly when significant technical problems are anticipated;

4. Involve unusual organizational complexity or technological advancement;

5. Require extensive interdepartmental, national, international coordination or support; or

6. Present unusual difficulties which need expeditious handling to satisfy an urgent requirement.[2]

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[1] United Research Report, p. 1-1.

[2] Department of Defense Directive 5010.14.

As might be expected there are often weapon or support systems that meet several of the above criteria. The COIN project, for the development of a counter insurgency airplane, is an example. It has a potential effect on the United States military posture, production costs are expected to exceed one hundred million dollars and since the airplane is expected to be used by Military Assistance program countries as well as all three United States Armed Forces, it will require extensive interdepartmental, national and international coordination.[1]

The Anti-Submarine Warfare project is an example of a project that encompasses many closely related work efforts which taken together exceed the RDT&E and production figures. It also significantly affects the United States military posture, necessitates national and international coordination, and requires that some efforts be conducted in a concurrent manner.[2]

In summary, the Department of Defense criteria for designating project management include the mandatory designation of projects that are considered as nationally urgent, mandatory designation of projects that are expected to exceed twenty-five million dollars in RDT&E funding or one hundred million dollars in production costs, and the optional designation of projects not in one of the first two groups but which meet certain guidelines. The optional guidelines are of a general nature and require subjective judgements, with the result that the Navy can undoubtedly designate any work effort it chooses by interpreting the guidelines to

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[1] Moore, p. 12.

[2] *Ibid.*, p. 22.

fit the situation. The result of the imposed requirements is that the Navy must designate certain weapon or support systems as projects and can designate as many additional ones as it desires.

CHAPTER VII

HOW THE DEPARTMENT OF DEFENSE CRITERIA WILL AFFECT THE NAVY

The mandatory requirement for selecting national urgency work programs as designated projects will have little if any effect on the Navy since such projects, Polaris for example, are now handled in this manner. Likewise, the optional guidelines should have little effect on the designation of projects by the Navy, unless the strong emphasis of project management by the Department of Defense leads Navy officials to believe that projects covered by the optional guidelines may not truly be regarded as optional. The credence placed in project management by the Department of Defense could easily cause the designation of projects in order to protect the Navy Department in case it is ever called upon by the Secretary of Defense to explain why a work effort is not proceeding satisfactorily. In a situation such as this, the first question asked might well be, "Why hasn't it been designated as a project?"

Although there may be a great deal of leeway in designating projects under the optional guidelines, under the mandatory rules, the requirements appear quite definitive. As of January, 1966 there were twenty-nine designated projects in the Department of the Navy (See Appendix I). If the Navy designates as a project, every new or major modification of existing production work efforts and new engineering or operational systems

developments that meet Department of Defense requirements, it will be required to designate over fifty additional projects.[1] There is some area at the present time for interpretation of the word "new." Since many projects are older generations of earlier developments, the Navy Department might be able to classify these as not "new" and therefore not subject to the Department of Defense Directive. However, as time goes on, and as present programs are dropped, and new ones adopted all will eventually become "new." The interpretation of what is "new" is only a temporary expedient to avoid designating some projects.

With the prospect of a potential total of 75 to 100 designated projects, with their corresponding managers, the question arises as to how the special attention of top management can be obtained with such a large number of designated projects. The current project managers have been reasonably successful in gaining the attention of high Navy officials, by such means as the Secretary of the Navy's Management Information Center briefings, but with the prospect of three times the number of present project managers the attention may be diluted considerably.

A large increase in the number of project managers will probably create competition for the limited number of qualified engineers and managers that are available in the Navy, and as more project managers are designated, more talent will have to be taken from the functional bureaus, the only available source. As a result the functional bureaus will have more requirements placed on them by project managers with fewer qualified

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[1] This information was obtained from a review of the fiscal records of the Office of Naval Material.

people available to provide these required services.

One alternative to the mandatory requirement for designating as projects all weapon and support systems involving a certain amount of money, would be to drop this requirement and let the designation be based on the optional guidelines. The use of project management could be encouraged without arbitrary monetary requirements. Another possibility that would reduce the number of potential designated projects would be to raise the monetary limits. This would increase the discretionary area for designation of projects and allow the exclusion of certain large dollar work efforts that do not face significant technology, interface, concurrency or coordination problems.

One course of action that might adapt itself to the present mandatory requirements for project management, would entail a radical reorganization of the material side of the Navy. The present organization, despite the 1963 reorganization of the Navy, is composed of four independent functional Bureaus.[1] Each has a historical function and has many of the weaknesses of functional managers cited by Peter Drucker.[2] Each has a mission of operating certain functionally specialized shore activities and each is the advisor to the Chief of Naval Operations and to the Chief of Naval Personnel concerning a group of functionally specialized officers.[3]

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[1] U. S. Department of the Navy, Assignment and Distribution of Authority and Responsibility for the Administration of the Department of the Navy, General Order No. 5, October 20, 1964.

[2] Drucker, op. cit.

[3] U. S. Department of the Navy, Assignment and Distribution of Authority and Responsibility for Exercise of Shore (Field) Activities of the Department of the Navy, General Order No. 19, October 20, 1964.

The nature of these missions requires taking a parochial viewpoint. These bureaus are supervised by the Chief of Naval Material but practical limitations of staffing and funding, as well as the historical functional missions, have permitted them to operate as autonomous organizations with limited inter-communication. If the bureaus were essentially disestablished and absorbed by the Office of Naval Material, the problems of the functional managers could be reduced. Such a reorganization would permit the project managers to operate more effectively and might result in better communication between functional units, thereby reducing the need for project management. The Dillon Report recommendations included at least the first step in such a reorganization.[1]

In summary, the present rigid Department of Defense requirements for designated projects will continue to expand their number. As a result a form of organization and management, originated to control a few especially high priority projects, will proliferate to include a large number of projects. Many of these are neither urgent nor technically complex but must be managed as if they were, solely because of the dollar expenditures involved. The special attention given a few high priority projects cannot, as a practical consideration, be provided to a multiplied number of projects.

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[1] Review of the Management of the Navy.

CHAPTER VIII

PROJECT MANAGEMENT IN INDUSTRY

The advancement of technology since World War II has affected industrial as well as governmental management. Like the Federal Government, industrial organizations have also been seeking innovations in management theories and techniques. Commercial firms have realized that new products and marketing strategy often do not fit the purely functional type of organization. Attempts have been made to mold the organization around the task. A new type of managerial control is needed, as the strictly functional organization does not meet the requirements of today's complex conditions:

> The pure functional approach cannot be applied when the task involves the coordinated effort of hundreds of organizations and people. Unique management relationships evolve in the development of a large single-purpose project that cuts across interior organizational flows of authority and responsibility, and radiates outside to independent organizations. The traditional management theory of Henri Fayol and Frederick Taylor is not suitable for managing large, single projects, such as those in the construction industry, or in manufacturing when a costly product requires the coordinated involvement of several organizations.[1]

Prior to the origin of project management, industrial firms used "project expeditors" and "project coordinators." These individuals did not actively enter into management functions, but instead they informally

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[1] David I. Cleland, "Why Project Management?" Business Horizons, (Winter, 1964).

motivated the persons doing the work, relying on diplomacy and persuasion to remove bottlenecks in the management process.[1]

The construction industry was one of the first to recognize the need for a management process that permitted a unifying manager the authority to cut across functional lines of the organization.[2] This approach was used in the construction of large single expensive projects such as dams and turnpikes. Outside the construction industry the use of project managers has been limited primarily to advanced technological industries such as electronics, nucleonics, astronautics, avionics and cryogenics. In these technical industries the project manager's job is to create a product, a piece of advanced technological hardware.[3] The project manager in this kind of industry is dedicated to the attainment of a goal within time, budget, and specification limitations. The characteristics that differentiate him from the traditional manager include:

1. He is concerned with accomplishing specific projects that require participation by organizational units outside his direct control.
2. He conflicts with functional managers who must share authority in their functional areas for the particular project.
3. He determines the when and what of project activities; the functional manager determines how.

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[1] *Ibid*.

[2] *Ibid*.

[3] Paul O. Gaddis, "The Project Manager," *Harvard Business Review*, (May-June 1959), p. 89.

4. The project manager's task is finite; after the project is completed personnel can be assigned to other activities.
5. A high percentage of the personnel supervised by the project manager are professionals; consequently he must use leadership techniques other than the simple superior-subordinate relationship.
6. The project manager does not normally possess any traditional line authority over the functional organizations that support him.[1]

Since most projects in private industry, other than those done under contract for the government, do not involve national urgency, what criteria are used for their establishment? A review of the literature on project management in industry indicates that there are few if any guidelines that approach the precise definitions used by the Department of Defense. Only generalities are found, such as the fact that project management is useful for developing a new product or for managing aggregate resources. In fact, there is a limited amount of literature concerning the use of project management in industry. When it is discussed it is most often in the context of the project manager for a government contractor who is doing work for a Department of Defense project manager. However, John F. Mee, in describing a management philosophy for the future, writes of a form

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[1] Cleland, op. cit.

[2] Joseph J. Moder and Cecil R. Phillips, Project Management With CPM and PERT (New York: Reinhold Publishing Corporation, 1964.)

of management that closely resembles project management as practiced by the Department of Defense:

> If the professional-manager type so prevalent today ever loses his competence to perform properly the management mission in a changing environment in a dynamic economy, one possible type of emerging management could be that of a group which would be formed for particular tasks and consist of a combination of technical specialists and professional generalists. The group management type would operate for the purpose of achieving difficult objectives, after which there would be a regrouping of personnel to encourage creativity and avoid stagnation of a bureaucracy.[1]

The history of project management in government and industry seems to indicate that the government, primarily the military establishment, developed this technique and that industry is subsequently adapting it to its needs.

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[1] John F. Mee, Management Thought in a Dynamic Economy (New York: United Press, 1963), p. 95.

CHAPTER IX

APPLICABLE MANAGEMENT THEORY

A current trend of management thinking centers around the establishment of predetermined objectives as a starting point for a philosophy or practice of management; therefore, policies and goals must be decided and a logical sequence of achieving those goals formulated before good management techniques can be practical in operating an organization. This logical sequence is a framework of coordinated objectives that extends from the lowest to the highest levels of the organization and provides constant direction to the broad overall goals. Such a philosophy has been called management by objectives.

Lyndall F. Urwick states that, "Unless we have a purpose, there is no reason why individuals should try to cooperate together at all or why anyone should try to organize them. Every organization and every part of every organization must be an expression of the purpose of the undertaking concerned or it is meaningless and therefore redundant."[1]

Peter F. Drucker has written that management by objectives enables a manager to control his own performance rather than having control imposed from above, and that it results in stronger motivation, higher performance goals and broader vision.[2]

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[1] Lyndall F. Urwick, Notes on the Theory of Organization (New York: American Management Association, 1952), pp. 18-19.

[2] Peter F. Drucker, The Practice of Management (New York: Harper and Brothers, 1954), p. 130.

To make this philosophy of management effective, first the objectives must be set; then management must establish a policy to ensure that these objectives do not become static. Static objectives eventually become as bad or worse than none at all. As old products are discarded and new ones created, and as new markets are born, so must new objectives be set.[1]

The final step under management by objectives is to implement the objectives by insuring that every man in the organization understands them. Unless this is done, the organization will be no better off than before. Non-communicated or misinterpreted objectives, like static ones, can be worse than useless. The importance of this step has been highlighted in an article by David S. Brown entitled, "Importance of Understanding Objectives."[2] This article also offers guidance in helping others to understand the objectives. It recommends employee meetings, agency publications, employee training and person to person relations as methods to be used to achieve clear understanding of objectives.

Charles H. Granger in his article, "The Hierarchy of Objectives," has listed seven points as a guide for deriving specific objectives from broader ones:

1. State the broad objectives.
2. Establish tentative criteria in the form of key result areas and standards for measuring the success of the broader

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[1] George R. Terry, Principles of Management (Homewood, Illinois: Richard D. Irwin, Inc., 1956), p. 156.

[2] David S. Brown, "Importance of Understanding Objectives," The Federal Accountant, (March, 1964), p. 64.

objectives, recognizing other objectives, and changing internal and external conditions.

3. Create alternative sub-missions or sub-objectives to attain broader objectives.

4. Analyze the effectiveness and the resources consumption or costs of these alternative sub-objectives.

5. Select and state the preferred sub-objectives.

6. Repeat the foregoing process to minimize inconsistencies and conflicts of the sub-objectives with each other and with the broader objectives.

7. State the final sub-objectives.[1]

The philosophy of management by objectives, with its predetermined objectives, derivation of sub-objectives, the logical sequence for achieving the objectives, the constant review of objectives and the need for complete understanding of the objectives at all levels, bears a close resemblance to project management as practiced in the Department of Defense.

The objectives of a designated project are established through the planning, programming and budgeting system of the Department of Defense and are expressed in the Five Year Force Structure and Financial Plan. For large projects, approval beyond the Secretary of Defense must be obtained from the Bureau of the Budget, the President and Congress. After approval through these channels, more explicit objectives are derived and promulgated in the initiating charter for the project.

The designated project manager and his staff must prepare a logical sequence for achieving the objectives. This is contained in the

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[1] Ibid., p. 24.

project master plan.[1] Objectives of the project are continually reviewed in the process of considering trade-offs.

The very nature of a designated project, with its goal of developing a weapon system, and participation in preparation of plans by most of the project manager's staff insures that the objectives will be well understood at all levels of the project management organization.

Among contemporary management theorists, there is definite lack of unanimity on the various management philosophies. Harold Koontz has pictured the situation as . . . "a jungle of confusion and conflict . . ." in his article, "Making Sense of Management Theory."[2] However, if management by objectives is a good philosophy then project management as utilized in the Department of Defense is theoretically sound management.

The philosophy of management by objectives seems to correlate well with project management but it is not necessarily helpful in deciding what criteria should be used in establishing designated projects. The same philosophy could be used by managers directing weapon or support systems that are not designated projects. The search for sound criteria to use in selecting designated projects finds only limited and general guidelines in contemporary management theory.

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[1] Project Master Plan.

[2] Harold Koontz, "Making Sense of Management Theory," Harvard Business Review, (July-August, 1962), p. 24.

CHAPTER X

SUMMARY AND CONCLUSIONS

Project management in the Navy is a specialized, intensive form of organization used to direct specifically designated work efforts. Projects and project managers are selected by the Secretary of the Navy, the Chief of Naval Material or the Chief of a Navy Bureau. Usually designated projects have as an objective the development of a weapon system, but in certain cases it may be the development of a logistic sub-system.

The project manager of a designated project is issued a charter which establishes the general objective of the project, scope of authority, responsibility, operating relationships and any special delegation of authority or exemptions from existing regulations.

When a project has substantially obtained its objectives it is reviewed for possible disestablishment. Each charter assigns a date for the first such review, and as goals are reached the project is eventually abolished.

The general objective of project management is to decrease the lead-time necessary to develop a system from its conceptual stage to a functioning operational end product. This is accomplished by assigning one executive to carry out a single purpose and providing him with the necessary talent, resources and authority to make timely decisions and to correct problems rapidly.

This reduction of lead time is required under the present world situation which seems to indicate that future wars will be won or lost through the use of forces in existence at the beginning of hostilities. The United States can no longer rely on industrial mobilization begun after the start of a war in order to insure victory.

Project management for the development of a weapon was first used during World War II to produce the atomic bomb. Since then it has been used to develop intercontinental missiles, nuclear power for submarines, anti-aircraft systems and anti-missile systems. More recently the military services, under Department of Defense prodding, have used project management for many less urgent projects.

A detailed and formalized planning procedure in the Navy precedes the time when a decision must be made as to whether or not a weapon or support system will be selected as a designated project. Those projects not selected for project management are managed by one of the functional bureaus of the Navy.

The subject of project management is a source of controversy among Navy top managers. It is generally felt that project management is effective but that it is expensive in the use of managerial and technical talent. This infers the probability that project management cannot be used for an unlimited number of weapon or support systems. The record of project management is good with respect to delivery on time and performance of weapon systems. The costs of these systems have always greatly exceeded original estimates but it is not clear whether project managers were at fault or whether exogenous factors were responsible.

The disadvantages of project management include the establishment of an "elite" group, which is likely to cause poor morale in the rest of the organization. In addition, the extensive documentation and reporting and the need for special training for personnel assigned to a project manager's staff make project management expensive.

The record of the early project managers in developing weapons in a short time caused the Department of Defense to search for guidelines to use for establishing a greater number of designated projects. A contractor was hired to perform a study and a conference was held with Defense personnel to search for the right criteria. In May 1965, the Department of Defense issued an instruction, based on the results of the study and conference, which requires the use of project management under certain conditions and makes it optional under others.

The mandatory requirements for using designated projects will cause an increase in the number of such projects from 29 to between 75 and 100. This increase will dilute the special attention by top Navy management accorded currently designated projects which are the truly high priority projects.

Industry recognizes the advantages of project management for certain situations but uses it less than the government and can offer little useful criteria for the selection of designated projects.

At least one contemporary management philosophy, management by objectives, correlates closely with current practice under project management, but since it is also adaptable to non-designated work efforts, it provides little useful guidance for the selection of designated projects.

This investigation of project management, and of the search for criteria to use in the selection of designated projects has led to several conclusions.

To be selected as a designated project, a weapon or support system should meet one or more of the following criteria;

1. Have a significant effect on military capability and be considered nationally urgent.

2. Have, or be expected to have, major technological difficulties.

3. Require extensive coordination with other military departments, federal agencies or foreign governments.

4. Be a complex developmental program undertaken on a concurrent basis.

A weapon or support system program should <u>not</u> be designated as a project solely on the basis of expected volume of expenditures.

The history of project management indicates that it has developed successful weapon systems in much less time than originally estimated and can be expanded to cover a limited number of programs other than those of national urgency.

Implementation of the 1965 Department of Defense mandatory requirements for the use of project management will greatly increase the number of the Navy's designated projects. This increase will dilute the currently available technical and managerial talent and may cause delays in the nationally urgent projects.

The Department of Defense should promulgate a more flexible policy for selecting designated projects.

APPENDIX I

WEAPON SYSTEMS DESIGNATED FOR PROJECT MANAGEMENT, NAVY DEPARTMENT

As of January 1, 1966

A. Designated by the Secretary of the Navy

Fleet Ballistic Missile (FBM) Project 2
Surface Missile System (SMS) Project 3
Anti-Submarine Warfare Systems (ASWS) Project 4
Fast Deployment Logistic Ship Project (FDL) Project 5

B. Designated by the Chief of Naval Material

F-111B Aircraft Project 6
Instrumentation Ships (IS) Project 7
All-Weather Carrier Landing System (ACLS) Project 8
Reconnaissance, Electronic Warfare, Special Operations and Naval Intelligence Processing System Project 9 (REWSON)
Air Traffic Control Radar Beacon Systems IFF/MARK XLL Systems Project 10 (AIMSO)
OMEGA Navigation Systems Project 11

C. Designated by the Chief, Bureau of Naval Weapons

E-2A/ ATDS Project 12
F-4 Sparrow Project 13
A-6/EA 6 Aircraft Project 14
A-5Ra-5 Aircraft Project 15
A-7 Aircraft Project 16
OV-10 (COIN) Aircraft Project 17
DASH Helicopter Project 18
Integrated Avionics System Project 19
Shrike Weapon System Project 20
Walleye Weapon System Project 21
ASROC Missile Weapon System Project 22
Munitions Project 23
F-8 Aircraft Weapon System Project 24
P3A Aircraft Project 25
VFAX Multi-Mission Fighter Attack Aircraft Project 26

D. Designated by the Chief, Bureau of Ships

Acoustics and Torpedo Countermeasures System Project 27
Sattelite Communications Project 28
Spanish Ships Support Project 29

DOCUMENTS DESIGNATING THE ABOVE PROJECTS

Designated by the Secretary of the Navy

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________. *Surface Missile System (SMS) Project*. (SECNAV 5430.56A) Washington: 26 February, 1964.

________. *Anti-Submarine Warfare Systems (ASWS) Project*. (SECNAV 5430.68) Washington: 2 July, 1964.

________. *Fast Deployment Logistic Ship Project (FDL)*. (SECNAV 5430.75) Washington: 18 October, 1965.

Designated by the Chief of Naval Material

________. *F-111B Aircraft Project* (NAVMAT 5410.6) Washington: October, 1965.

________. *Instrumentation Ships (IS) Project* (NAVMAT 5410.3) Washington: 24 January, 1964.

________. *All-Weather Carrier Landing System (ACLS) Project*. (NAVMAT 5430.14) Washington: 16 June, 1964.

________. *Reconnaissance, Electronic Warfare, Special Operations and Naval Intelligence Processing System (REWSON)*. (NAVMAT 05430.17) Washington: 22 October, 1964.

________. *Air Traffic Control Radar Beacon Systems (ATRBS) IFF/MARK XII Systems Project (AIMS) (NAVMAT 5410.4)*. Washington: 24 February, 1965.

________. *OMEGA Navigation System Project (NAVMAT 5410.5)* Washington, 18 June, 1965.

Designated by the Chief, Bureau of Naval Weapons

________. E-2A/ATDS Project. (BUWEPS 5430.15) Chief of Bureau of Naval Weapons. Washington: December, 1964.

________. F-4 Sparrow Project. (BUWEPS 5430.22). Washington: 20 July, 1965.

________. A-6/EA 6 Aircraft Project. (BUWEPS 5430.22) Washington: 20 July, 1965.

________. A-5/RA5 Aircraft Project. (BUWEPS Memo C:ERE) Washington: 17 March, 1964.

________. OV-10 (COIN) Aircraft Project. (BUWEPS 5430.23) Washington: 20 July, 1965.

________. DASH Helicopter Project. (BUWEPS Memo CU-7:TCH) Washington: 18 December, 1963.

________. Integrated Avionics System Project. (BUWEPS 5430.19) Washington: 23 April, 1965.

________. Shrike Weapon System Project. (BUWEPS 5430.21) Washington: 23 April, 1965.

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________. Munitions Project. (BUWEPS 5430.25) Washington: 27 July, 1965.

________. F-8 Aircraft Weapon System Project. (BUWEPS 5430.27) Washington: 15 October, 1965.

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Designated by the Chief, Bureau of Ships

________. Acoustics and Torpedo Countermeasures System Project. (BUSHIPS 5432.1) Chief of Bureau of Ships. Washington: October, 1964.

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